between the roll and yaw angles, for instance when the momentum wheel has failed. A daily monitoring of the yaw angle profile is also useful to evaluate the health of the attitude control system.

Against this background the technical problem to be solved is to provide a method and an apparatus for determining the yaw angle of a satellite on the basis of sensor measurement signals readily available at the satellite, i.e. without the requirement of additional sensors.

~~This problem is solved by a method according to the claims 1 to 4, by a method according to the claims 5 to 11, by an apparatus according to the claims 14 to 17 and by an apparatus according to the claims 18 to 24.~~

A very advantageous aspect of the invention is the fact that the invention needs no estimation schemes which introduce a considerable delay in computing the yaw angle. Rather the invention makes use of a direct measurement of the yaw angle by means of sensors already present on the satellite. This makes it possible to provide a fast yaw measurement avoiding to collect hours of data before be able to infer a good yaw estimation.

The method is not based on a model matching estimation scheme as mentioned hereabove, but on a direct measurement of the yaw angle purely based on the geometry of the sensors. In other words, this method does not require long data collection periods, but only needs one measurement on two sensors to infer a yaw angle. This is particularly of interest when the spacecraft undergoes some unexpected attitude disturbance. In this case, if a model-matching estimation scheme is used, since the model would not fit the observation, the whole data collection should be restarted after the disturbance for proper yaw estimation. With the method according to the invention, only one measurement, at some point in time, of two offset sensors would be needed

The theory assumes perfectly stable sensors whose boresights are always pointing in the same direction with respect to the satellite's coordinate frame. However, real attitude sensors are not perfect. Their reading and pointing are for instance quite sensitive to thermal variation or aging. For instance, due to the daily rotation of a geostationary spacecraft's body, the structure on which a sensor is mounted follows a daily distortion cycle due to cycling sun exposure. Another source of spurious error can be a initial misalignment of the sensor on the spacecraft body.

Hence, applying the yaw measurement as mentioned above, a further problem occurs in calibrating this yaw measurement also readily available at the satellite without a requirement of additional sensors.

~~This problem is solved by a method according to claim 12, by a method according to claim 13, by an apparatus according to claim 25 and by an apparatus according to claim 26.~~

The method according to the invention allows to measure the yaw angle from the reading of two different sensors measuring the roll and/or pitch angles, provided that the reference point of the two sensors are not identical. The description is given basically for geostationary satellites but the invention can be applied directly to satellites which are stationary with respect to any star. The method can also be employed for non circular orbits. The method assumes that the orbit of the spacecraft is known at any time.

In the following, the method and the apparatus according to the invention and its principles will be explained in greater detail with reference to the drawings of which

Fig. 1 shows a view of an orbiting satellite in an earth orbit for illustrating a reference coordinate system.